SUBJECT INDEX

A

30A5 cells
  adipocyte development and, 104
Acetate
  horse nutrition and, 246-47
  resistant starch and, 311-12, 314-15
Acetoacetyl-CoA ligase
  AR rat pups and, 35
Acetyl CoA carboxylase
  adipocyte development and, 103
  PUFAs and, 86
Acetylcholine
  choline metabolism and 270-71, 276-77
  insulin secretion and, 62, 76
α1-Acid glycoprotein (AGP)
  transthyretin and, 511, 517-19
Acidosis
  metabolic
    essential fructose metabolism and, 46, 50, 53, 55
    oral rehydration solutions and, 329
Aconitase
  infection and, 477-78
Actin
  adipocyte development and, 102-3, 108-9
  PUFAs and, 88
Acute booster reactants
  transthyretin and, 515, 519-20
Acute phase proteins
  metal elements in gene expression and, 460-61
  transthyretin and, 511-12, 515, 517, 519
Acyl-CoA oxidase
  PUFAs and, 92
AD4743
  adipocyte development and, 106
ADD1 gene
  adipocyte development and, 109, 115-16, 118
Adenosine diphosphate (ADP)
  insulin secretion and, 70-71, 73
  oxidative phosphorylation and, 538
Adenosine monophosphate (AMP)
  fructose metabolism and, 44, 47-48
Adenosine triphosphate (ATP)
  fructose metabolism and, 42-44, 47-48, 52
  insulin secretion and, 62, 70-73, 75-76
  oral rehydration solutions and, 326
  oxidative phosphorylation and, 538, 540
S-Adenosylhomocysteine
  choline metabolism and, 272, 275
S-Adenosylmethionine
  choline metabolism and, 272-73, 275
Adenylate cyclase
  cortisol and, 517
  essential fructosuria and, 52
  PUFAs and, 89
Adenylyl cyclase
  insulin secretion and, 62-65, 76
Adipocytes
  regulation of development
    ADD1 gene and, 115-16
    adipose tissue-specific enhancer and, 115
    C/EBP gene family and, 109-15
    cell/cell contact at confluence, 107
    cell culture models and, 101-5
    clonal expansion and, 107-8
    derepression and, 116-18
    determination and, 106-7
    development program and, 106-9
    external modulators of preadipocyte differentiation, 105-6
    HNF3/*forkhead* and, 116
    induction of differentiation and, 107-8
    introduction to, 99-101
    multipotent stem-cell lines and, 101
    preadipocyte cell lines and, 102-5
    protein expression and, 108
    repressors and, 116-18
    terminal differentiation and, 108-9
    trans-acting factors and, 109-18
    transcriptional control of genes and, 109-19
    transcription factor expression and, 118-19
Adipose regulatory factor 6 (ARF-6)
  adipocyte development and, 109
Adipose tissue
  AR rat pups and, 35-37
  fructose metabolism and, 45
Adipose tissue-specific enhancer
  adipocyte development and, 115
Adipsin
  adipocyte development and, 103-4, 117
Adolescence
  osteopenia of prematurity and, 183
  transthyretin and, 504
ADP-ribosyltransferase
  insulin secretion and, 63
Adrenal glands
  AR rat pups and, 29
Adrenaline
  transthyretin and, 510
Adrenal leukodystrophy
  peroxisomal lipid metabolism and, 362-63
β-Adrenergic receptors
  adipocyte development and, 103
Adrenoxin
  infection and, 477
Aerobactin
  infection and, 478, 480
Aeromonas hydrophila
  iron-binding proteins and, 485
Africa
  childhood malnutrition and, 3-5, 12-15
  migratory birds and, 188, 190
  TBG levels and, 500
  transthyretin and, 500-2
Alanine
  fructose metabolism and, 51, 53-54
  oral rehydration solutions and, 327, 330-31
Alanine transaminase (ALT)
  choline and, 285, 287
Albumin
  childhood malnutrition and, 7-8
  iron-binding proteins and, 476, 487
  peptide diets and, 427
  transthyretin and, 506-7, 509-10, 512, 519-20

Alcohol
AR rat pups and, 23, 31-33
breast cancer and, 411-12
choline and, 287
fructose 1,6-biphosphatase deficiency and, 55
Aldolase
adipocyte development and, 103
fructose metabolism and, 42-45, 47-48, 50-52
Aldosterone
adipocyte development and, 106
Alkaline phosphatase
horse nutrition and, 246
osteopenia of prematurity and, 170-72, 178-79
all-trans retinoic acid
peroxisome proliferation and, 356
Aluminum
gene regulation and, 456
osteopenia of prematurity and, 175-76
Alzheimer's disease
choline and, 277
oxidative phosphorylation and, 536
α-Amidated peptides
vitamin C and, 373
Amido phosphoribosyl transferase
iron-binding proteins and, 477
Amino acids
AR rat pups and, 28
childhood malnutrition and, 7, 9-10, 12
fructose metabolism and, 42, 44, 50-51
horse nutrition and, 248, 255-56
human requirements for
background on, 217-19
break-point analysis and, 223-24
carbon labeling and, 227-29
criteria of adequacy and, 234-35
food intake and, 230-32
future research on, 237-38
gastrointestinal tract and, 235-36
nitrogen balance and, 219-23
obligatory nitrogen loss and, 232-34
oxidation and, 223-32
tracer balance method and, 224-32
insulin secretion and, 60
nitric oxide synthases and, 137
oral rehydration solutions and, 326-28, 330-31, 334, 336
osteopenia of prematurity and, 171, 175-76
oxidative phosphorylation and, 539
peptides and, 420-37
peroxisomal lipid metabolism and, 362
transthyretin and, 499-501, 508-9, 511, 520
Amino acyl-tRNA synthetases
childhood malnutrition and, 10
Aminosol
AR rat pups and, 27
Amirige
peptide diets and, 426
Ammonia
amino acids and, 236
childhood malnutrition and, 10
horse nutrition and, 248, 256
AMP deaminase
fructose metabolism and, 48
Amyloidosis
transthyretin and, 500-2, 520
Amylopectin
resistant starch and, 298-305
Amylose
resistant starch and, 298-99, 301-5
Amyotrophic lateral sclerosis (ALE)
antioxidants and, 261
Anabolism
childhood malnutrition and, 10
Angiotensin
adipocyte development and, 103
Annexin
adipocyte development and, 103
Anoxia
fructose metabolism and, 46
Antarctica
migratory birds and, 188
ANT gene
oxidative phosphorylation and, 542
Antibodies
nitric oxide synthases and, 133
transthyretin and, 506
Antioxidants
horse nutrition and, 259, 261
vitamin C and, 372-73
Aplysia californica
insulin secretion and, 74
Apolipoproteins
adipocyte development and, 103
childhood malnutrition and, 7
PUFAs and, 92
Apoptosis
choline and, 276
Apples
choline and, 284
Arachidonic acid
adipocyte development and, 106
insulin secretion and, 63-64, 67-69, 75-76
Arcabose
resistant starch and, 313
Archilochus colubris
energy storage and, 188, 191
Arginine
childhood malnutrition and, 9
horse nutrition and, 256
human requirements for, 222-23
nitric oxide synthases and, 132-41
Arsenic
gene regulation and, 452, 456
Artificially-reared (AR) rat pups
automatic feeder procedure and, 26
brain development and, 31-32
carbohydrate-metabolizing enzymes and, 29-31
feeding tubes and, 23-26
hand feeding and, 23
hepatic lipogenesis and, 32-35
introduction to, 21-23
long-term consequences of early nutritional intervention, 35-37
milk-based formulas and, 26-28
non-milk-based formulas and, 28-29
preweaning period and, 29-35
Ascites
essential fructosuria and, 49
Ascorbic acid
adipocyte development and, 106
Asia
migratory birds and, 188
stunting and, 11
Aspartic acid
essential fructosuria and, 51
Atlantic Ocean
migratory birds and, 188
ATP-citrate lyase
adipocyte development and, 103
Australia
breast cancer and, 407
migratory birds and, 188
resistant starch and, 310
TBG levels and, 500
Automatic feeder
AR rat pups and, 24, 26
Autosomal recessive inheritance
essential fructosuria and, 49
5-Azacytidine
adipocyte development and, 101, 106

B

Bacille Calmette-Guèin (BCG
  nitric oxide synthases and, 134
Bacillus subtilis
  iron-binding proteins and, 479, 481
Bacteria
  iron proteins and, 471-88
Bacterioferritin
  infection and, 476, 478
Bacteroides gingivalis
  iron-binding proteins and, 487
Balb/c 3T3 cells
  adipocyte development and, 101, 108-9
Bananas
  choline and, 284
  resistant starch and, 304
Bangladesh
  stunting and, 11
Barley
  resistant starch and, 305, 308
Basal metabolic rate (BMR)
  childhood malnutrition and, 5-6, 13
Beans
  resistant starch and, 306-10, 314
Beef
  choline and, 284-85
Behavioral development
  AR rat pups and, 37
Bermudagrass hay
  horse nutrition and, 255
Beryllium
  gene regulation and, 463
Betaine
  choline and, 270-71
Bezafibrate
  adipocyte development and, 106
Bicarbonate
  amino acids and, 232
  oral rehydration solutions and, 329
Bilirubin
  essential fructosuria and, 50
Bird migration
  energy accumulation and body reserves, 205-6
  circannual rhythms, 199-200
  energy reserves, 189-91
  food, 192-99
  frugivory, 194-96, 198-99
  introduction to, 187-89
  migratory fattening, 199
  nutrient composition, 196-98
  nutrient selection, 198
  nutritional mechanisms for migratory fueling, 191-206
  photoperiodicity, 200-1
  population-specific programs, 201-5
  secondary plant metabolites, 196
  species-specific programs, 201-5
  temporal control, 199
Blended oil diet
  horse nutrition and, 253
Blood
  peptides and, 420-21
Blood clotting factors
  essential fructosuria and, 50
Blood pressure
  vitamin C and, 376-77
BMS2 cells
  adipocyte development and, 104
Body mass
  AR rat pups and, 27, 29-31, 33
  childhood malnutrition and, 5-7
  horse nutrition and, 249, 252
  migratory birds and, 188-93, 195-97, 202-4, 206
Body mass index (BMI)
  breast cancer and, 395, 397-99
Body size
  breast cancer and, 394-99
Bone marrow
  stromal vascular preadipocytes and, 104
Bone mineral content (BMC)
  osteopenia of prematurity and, 176-77, 179, 182
Bordetella pertussis
  iron-binding proteins and, 485
B-oxidation
  PUFAs and, 84
Bradykinin
  nitric oxide synthases and, 137
Brain
  AR rat pups and, 22-23, 28, 31-33, 37
  childhood malnutrition and, 5-6
  choline and, 271, 282-84, 288
  nitric oxide synthases and, 133-38, 140
Branta b. bernicla
  energy storage and, 192
Brazil
  breast cancer and, 398
Bread
  choline and, 284
  resistant starch and, 304-5, 310
Break-point analysis
  amino acids and, 223-24
Breast cancer
  alcohol and, 411
  animal studies and, 394, 397
  anticarcinogenic phytochemicals and, 412
  body mass index and, 395, 397-99
  body size and, 394-97
  caffeine and, 411-12
  case-control studies and, 401-2
  cohort studies and, 402-4
  dietary fat and, 397, 400-5
  dietary fiber and, 405
  ecologic studies and, 397, 400
  height and, 394-96
  introduction to, 393-94
  micronutrients and, 406-11
  selenium and, 410-11
  special populations and, 401
  temporal trends and, 400-1
  total energy intake and, 394-97
  vitamin A and, 406-9
  vitamin C and, 410
  vitamin E and, 409-10
Breast milk
  AR rat pups and, 22
  childhood malnutrition and, 14, 16
  choline and, 285
  essential fructosuria and, 49
Britain
  breast cancer and, 401
  resistant starch and, 310
British Columbia
  breast cancer and, 398
Bronchopulmonary dysplasia
  osteopenia of prematurity and, 170, 172, 176
Bureau of Home Economics (BHE) rats
  insulin secretion and, 61
Butter
  choline and, 284
Butyrate
  horse nutrition and, 246
  resistant starch and, 311-16

C

C57BL/6J *ob/ob* mice
  adipocyte development and, 104
Ca^{2+}
  choline and, 278-80
  insulin secretion and, 60, 64-76
  nitric oxide synthases and, 132-33
Cadmium
  gene regulation and, 450, 452, 457, 460, 464
Caecum
  amino acids and, 227
  AR rat pups and, 28, 38
  horse nutrition and, 244-47
Caffeine
  breast cancer and, 411-12
  insulin secretion and, 73
Calcium
  horse nutrition and, 258

osteopenia of prematurity and, 170-76, 178-79, 181-82
stunting and, 12
Calidris spp.
energy storage and, 188
Calmodulin
insulin secretion and, 68
nitric oxide synthases and, 134-36, 141
Calmodulin-dependent kinase (CaM K)
insulin secretion and, 73, 76
Caloric requirements
horse nutrition and, 252, 254, 256
Calrose sp.
resistant starch and, 309
Canada
breast cancer and, 398, 408
essential fructosuria and, 51
transthyretin and, 502
Cancer
choline and, 271, 281-82
peroxisome proliferation and, 358-59
PUFAs and, 94
vitamin C and, 379-80
Candida glabrata
metal elements in gene expression and, 456
Canola meal
horse nutrition and, 256
Cape Town
childhood malnutrition and, 8
Carbachol
insulin secretion and, 67-69, 74-75
Carbamylcholine
insulin secretion and, 67
Carbohydrate
AR rat pups and, 22-23, 26-29, 33-37
horse nutrition and, 247, 257, 261
migratory birds and, 189-90, 198
oral rehydration solutions and, 327
PUFAs and, 91
resistant starch and, 308-15
Carbohydrate-metabolizing enzymes
AR rat pups and, 29-31
Carbon labeling
amino acids and, 227-29
Cardiac arrest
fructose 1,6-biphosphatase deficiency and, 53
Cardiac output
childhood malnutrition and, 6
Caribbean
migratory birds and, 188
Caries
essential fructosuria and, 50
Carnitine
horse nutrition and, 255-56
vitamin C and, 373
Carnosine
horse nutrition and, 255
Carotenoids
breast cancer and, 406-9, 412
Cartilage
stunting and, 12
Casein
AR rat pups and, 27
β-Casomorphin
oral rehydration solutions and, 331
Catabolism
childhood malnutrition and, 10
protein, 233
purine, 47-48
Catalase
infection and, 476-77
Cataracts
vitamin C and, 374-75
Catecholamine
insulin secretion and, 62
Catechols
infection and, 478
Cauliflower
choline and, 284
C/EBP gene family
adipocyte development and, 104, 108-15
transthyretin and, 512
Cell culture models
adipocyte development and, 101-5
Cellulose
horse nutrition and, 247
resistant starch and, 308
Central America
childhood malnutrition and, 3, 14
Central nervous system (CNS)
fetal alcohol syndrome and, 31
nitric oxide synthases and, 132
oxidative phosphorylation and, 540
transthyretin and, 505
Ceramide
choline and, 276, 280
Cereals
oral rehydration solutions and, 327-28, 331, 335
resistant starch and, 304, 306
Cerebellum
AR rat pups and, 32
Cerebrospinal fluid (CSF)
transthyretin and, 505-6
c-fos protein
PUFAs and, 92
CHEF/18 cells
adipocyte development and, 101
Children
essential fructosuria and, 49-50, 52-53
fructose 1,6-biphosphatase deficiency and, 53-54
malnutrition and, 1-17, 333-34
oral rehydration solutions and, 333-34
rickets and, 169
Chile
childhood malnutrition and, 3
Chloramphenicol
oxidative phosphorylation diseases and, 558
Chloramphenicol acetyltransferase (CAT)
PUFAs and, 90
Chloride
oral rehydration solutions and, 322
Cholecystokinin (CCK)
insulin secretion and, 76
Cholera toxin
insulin secretion and, 63
Cholesterol
AR rat pups and, 29, 35
peroxisomal lipid metabolism and, 355
Cholesterol esterase
adipocyte development and, 103
Choline
acetylcholine and, 276-77
brain and, 282-84
carcinogenesis and, 281-82
choline-containing compounds and, 270
deficiency of, 3, 285-88
dietary sources of, 284-85
introduction to, 269-71
metabolism of, 271-77
methyl groups and, 271-73
phosphatidylcholine and, 273-75
phospholipids and, 277-84
platelet-activating factor and, 275
signal transduction and, 278-81
sphingomyelin and, 276
VLDL and, 277
Chondroitin sulfate
stunting and, 12
CHOP-10 factor
adipocyte development and, 116-18
Chronic progressive external ophthalmoplegia (CPEO) syndromes
oxidative phosphorylation and, 536, 543-44

Ciprofibrate
peroxisome proliferation and, 356, 359
Circannual rhythms
migratory birds and, 199-200, 206
cis-regulatory elements
PUFAs and, 89-91, 94
Citrate
iron-binding proteins and, 485
oral rehydration solutions and, 322
L-Citrulline
nitric oxide synthases and, 132-33, 135, 137-38, 140
c-jun protein
PUFAs and, 92
Clofibrate
peroxisome proliferation and, 356
Clone 5 protein
adipocyte development and, 103
c-myc oncogene
adipocyte development and, 118
Cobalt
gene regulation and, 456, 462
Coenzyme Q10
oxidative phosphorylation diseases and, 537-38, 554-56
Coffee
choline and, 284
Colitis
growth factors and, 161
Collagen
adipocyte development and, 103, 107
childhood malnutrition and, 5, 13
vitamin C and, 373
Colon
childhood malnutrition and, 9
horse nutrition and, 244-47
oral rehydration solutions and, 335-36
resistant starch and, 314-15
Colony-stimulating factor (CSF)
adipocyte development and, 103
Colostrum
growth factors and, 148, 150, 152, 156, 161
Columbinic acid
gene transcription and, 87
Commonwealth of Independent States (former Soviet Union)
peptide diets and, 428
Component X
transthyretin and, 503
Copper
gene regulation and, 450, 452, 454, 456, 458-61, 464
horse nutrition and, 257-58
Coprogen
infection and, 480
Coprophagy
horse nutrition and, 248
resistant starch and, 316
Copy DNA (cDNA)
cADPR cyclase, 74
fructokinase, 42
fructose 1,6-biphosphatase, 54
glucokinase, 45-46
Corn
horse nutrition and, 249, 255
Cornflakes
resistant starch and, 304, 308-9
Corn oil
AR rat pups and, 24-25, 27-28
choline and, 284
PUFAs and, 86-87, 89
Coronary heart disease
vitamin C and, 377-79
Corticosteroid-binding globulin (CBG)
transthyretin and, 506, 512, 516-17, 520
Corticosteroids
choline and, 276
osteopenia of prematurity and, 176
oxidative phosphorylation diseases and, 557
Corticosterone
AR rat pups and, 30-31
Cortisol
childhood malnutrition and, 7-8
transthyretin and, 510, 516-18, 520
COS-7 cells
nitric oxide synthases and, 137
Cottonseed oil
PUFAs and, 86
Cream
AR rat pups and, 27
Creatine
insulin secretion and, 71
Creatinine-height index
childhood malnutrition and, 6-7
Crohn's disease
growth factors and, 161
Crucifers
breast cancer and, 412
Cucumbers
choline and, 284
CUP protein
adipocyte development and, 109, 114, 119
Cyclic adenosine monophosphate (cAMP)
adipocyte development and, 104, 107
choline and, 274
essential fructosuria and, 52
insulin secretion and, 60, 64-66, 73, 75-76
nitric oxide synthases and, 135
PUFAs and, 88-89
Cyclic ADP-ribose (cADPR)
insulin secretion and, 74-76
Cyclic guanosine monophosphate (cGMP)
nitric oxide synthases and, 132-33, 136
Cyclic nucleotide phosphodiesterase
cGMP-inhibited
adipocyte development and, 103
Cysteine
intravenous, 428, 430
Cystine
human requirements for, 218, 220, 226, 233-34
Cytidine diphosphocholine
choline metabolism and, 272-76
Cytidylyltransferase
choline and, 273-74
Cytochrome *c*
oxidative phosphorylation and, 537-38
Cytochrome *c* reductase
nitric oxide synthases and, 141
Cytochrome P450 reductase
nitric oxide synthases and, 135, 137-39, 141
Cytokines
transthyretin and, 511-13, 516, 518-19

D

db/db mice
insulin secretion and, 61
Deafness
oxidative phosphorylation and, 545-46
3-Deazaadenosine
adipocyte development and, 106
Decorin
adipocyte development and, 103
Dehydration
childhood malnutrition and, 10
diarrhea and, 322-36
Dehydroepiandrosterone (DHEA)
peroxisomal proliferation and, 356, 360
Dendroica striata
energy storage and, 188
Denmark
breast cancer and, 407
transthyretin and, 502
Depeptidase
tissues and, 421

Depolymerization
resistant starch and, 304
Desaturases
fatty acid elongation and, 353
PUFAs and, 85-86, 92, 94
Detergent fiber
horse nutrition and, 247, 250
Developing nations
childhood malnutrition and, 1-17
Developmental orthopedic disease
horse nutrition and, 250, 257-58
Dexamethasone
adipocyte development and, 104-5
IGFs and, 159
Dextrose
osteopenia of prematurity and, 175
Diabetes mellitus
fructose metabolism and, 45, 49
IGFs and, 159
insulin secretion and, 61
oxidative phosphorylation and, 545-46
PUFAs and, 94
transthyretin and, 509
vitamin C and, 376
Diacylglycerol
choline and, 273-74, 276, 278-82
insulin secretion and, 67-68, 75-76
Diacylglycerol acyltransferase
adipocyte development and, 103
Diarrhea
childhood malnutrition and, 2, 5, 16
growth factors and, 161
oral rehydration and, 322-36
resistant starch and, 308-9
Dibutyryl cAMP
essential fructosuria and, 52
Dichloroacetate (DCA)
oxidative phosphorylation diseases and, 557-58
Diet
amino acids and, 229-32, 235-37
breast cancer and, 397, 400-4
choline and, 284-88
horse nutrition and, 245, 249-50, 252-54, 257
migratory birds and, 192-99
peptide, 425-28
PUFAs and, 83-94
Digestion
peptides and, 425
Dihydroxyacetone (DHA)
fructose metabolism and, 43, 48
Dioxygenases
infection and, 477
Dipeptides
intravenous, 429-34
oral rehydration solutions and, 326-28
DNA
growth factors in milk and, 148
Dolichols
peroxisomal lipid metabolism and, 355
Dolichonyx oryzivorus
energy storage and, 192
Doongara sp.
resistant starch and, 309
Dual energy X-ray absorptiometry (DEXA)
osteopenia of prematurity and, 177-79
Dual photon absorptiometry (DPA)
osteopenia of prematurity and, 177-78
Dumetella carolinensis
energy storage and, 190, 198

E

Edema
childhood malnutrition and, 2-4, 7-8
essential fructosuria and, 49
Eggs
choline and, 284-85
EGTA
insulin secretion and, 65
Egypt
stunting and, 12
Eicosatetraynoic acid (ETYA)
gene transcription and, 87
PUFAs and, 93
Elderly
choline and, 271
transthyretin and, 500
Electrolytes
childhood malnutrition and, 10
oral rehydration and, 322-36
peptide diet and, 427
Emberiza hortulana
energy storage and, 192
Embryo
adipocyte development and, 100, 102
Endothelial cells
nitric oxide synthases and, 133-34, 136-38
Endothelium-derived relaxing factor (EDRF)
nitric oxide synthases and, 132, 136
Energy
requirements
childhood malnutrition and, 13-15, 17
storage
migratory birds and, 187-207
Entactin
adipocyte development and, 103
Enterobacter spp.
iron-binding proteins and, 480
Enterochelin
infection and, 478, 480
Environmental temperature
horse nutrition and, 254-55
Enzymes
adipocyte development and, 103
AR rat pups and, 22-23, 29-31, 33-35
childhood malnutrition and, 9-10, 16
fructose metabolism and, 42-44, 46, 48, 52, 54
oxidative phosphorylation and, 537-38
peptides and, 422
peroxisomes and, 346-49, 359-62
PUFAs and, 85-86
transthyretin and, 517
vitamin C and, 373
Epidermal growth factor (EGF)
AR rat pups and, 29
choline and, 280
milk and, 148-53, 161
Equine degenerative myeloencephalopathy
horse nutrition and, 261
Equine motor neuron disease
horse nutrition and, 260-61
Erithacus rubecula
energy storage and, 188
Escherichia coli
diarrhea and, 323, 328, 334
fructose 1,6-biphosphatase and, 44
iron-binding proteins and, 478-81, 483, 486, 488
metal elements in gene expression and, 456
nitric oxide synthases and, 131-32, 141
Estrogen
transthyretin and, 505
Estrogen synthetase
adipocyte development and, 103
Ethanol
AR rat pups and, 31-32
Ether extract
horse nutrition and, 250

Ether glycerolipids
synthesis of, 353-55
Europe
breast cancer and, 395
essential fructosuria and, 51
migratory birds and, 188, 190
Evaporated milk
AR rat pups and, 27-28

F

FAD
nitric oxide synthases and, 131, 135-36, 139-42
fa/fa Zucker rats
insulin secretion and, 61
Failure to thrive
essential fructosuria and, 49
FAS enzyme
PUFAs and, 85-90, 92
Fasting
amino acid balance and, 229-31, 237
fructose 1,6-biphosphatase deficiency and, 53, 55
Fat
AR rat pups and, 22, 28-29, 34-37
breast cancer and, 397, 400-5
emulsion
osteopenia of prematurity and, 171
horse nutrition and, 249-51, 253, 257, 261
migratory birds and, 189-92, 196-200, 202-5
PUFAs and, 84
Fatty acids
AR rat pups and, 29, 35
choline and, 274, 280, 288
horse nutrition and, 246-47, 253
migratory birds and, 191, 196-98
mitochondria and, 349-52
(*n*-3)
gene transcription and, 85-93
(*n*-6)
gene transcription and, 85-93
inhibitors of, 86-87
insulin secretion and, 60
peroxisomes and, 345-46, 352-53
resistant starch and, 300, 311-15
Fatty acid synthase
adipocyte development and, 103, 109, 115
AR rat pups and, 35-37
1-Fatty acyl, 2-lysophosphatidylcholine
insulin secretion and, 66
Fatty liver disease
childhood malnutrition and, 3, 7
Fecal bulking
resistant starch and, 310, 316
Feeding tubes
AR rat pups and, 23-26
Fenofibrate
peroxisome proliferation and, 356
Fermentation
resistant starch and, 311-15
Ferredoxin-like proteins
infection and, 477
Ferredoxin-$NADP^+$ reductase
nitric oxide synthases and, 135
Ferrichrome
infection and, 480
Ferric iron-binding protein
infection and, 484-85, 487
Ferritin
infection and, 475-76, 486
Fetal alcohol syndrome
AR rat pups and, 31-32
Fetal bovine serum
adipocyte development and, 102, 105
Fetus
epidermal growth factor and, 152
horse nutrition and, 250-51
transthyretin and, 504
Fiber
dietary
breast cancer and, 405
horse nutrition and, 245, 247, 254
resistant starch and, 308-9, 316
Fibroblast growth factor (FGF)
adipocyte development and, 107
Ficedula spp.
energy storage and, 201
Finland
breast cancer and, 411
Flavins
oxidative phosphorylation and, 537
Flour-feeding injury
protein deficiency and, 2
Fluoride
insulin secretion and, 64
FMN
nitric oxide synthases and, 131, 135-36, 139-42
Folate
choline metabolism and, 271-73, 286, 288
pregnancy and, 271
Folic acid
deficiency
nitric oxide synthases and, 141
Food
intake
amino acids and, 230-32
migratory birds and, 191-99
locally available
oral rehydration solutions and, 327-28
processing
resistant starch and, 300-3, 306
Forage
horse nutrition and, 248-49, 259
Fore brain
AR rat pups and, 32
Forskolin
insulin secretion and, 65
Fractures
osteopenia of prematurity and, 170-73, 179, 181-82
France
breast cancer and, 408
stunting and, 13
transthyretin and, 502
Free hormone hypothesis
transthyretin and, 512-13, 520
Free radicals
childhood malnutrition and, 16
choline and, 282
nitric oxide synthases and, 139
oxidative phosphorylation and, 541
Fringilla coelebs
energy storage and, 192
Fructokinase
essential fructosuria and, 49
fructose metabolism and, 42, 43, 48
Fructose
metabolism
alternate pathways of, 45
enzymes and, 42-44
essential fructosuria and, 48-53
fructose 1,6-biphosphatase deficiency and, 53-55
glycolytic pathway and, 46-47
hepatic glucose uptake and, 45-46
introduction to, 41-42
purine catabolism and, 47-48
toxicity of parenteral fructose, 46-48
resistant starch and, 306
Frugivory
seasonal
migratory birds and, 194-96, 198-99
Fruits
breast cancer and, 412
essential fructosuria and, 49

oral rehydration solutions and, 327
FSP27 protein
adipocyte development and, 103
Fura-2
insulin secretion and, 69, 72
Fur protein
iron and, 455-56

G

*gadd*153 gene
adipocyte development and, 117
Gambia, The
childhood malnutrition and, 7-8, 15
Gastric infusion techniques
AR rat pups and, 24-25
Gastric inhibitory polypeptide (GIP)
insulin secretion and, 62, 64, 76
Gastrointestinal tract
amino acids and, 225-27, 235-36
AR rat pups and, 23, 27-31, 38
fructose metabolism and, 42, 45
growth factors and, 147-48, 152-53, 155-56, 159, 161
horse and, 244-48
peptides and, 421-25
resistant starch and, 310-15
Gastrostomy technique
semiautomated
AR rat pups and, 29
Gelation
resistant starch and, 302-3
Gemfibrozil
peroxisome proliferation and, 356
Gender
amino acid requirements and, 218-20, 237
fructose 1,6-biphosphatase deficiency and, 54
transthyretin and, 504
Gene 154 protein
adipocyte development and, 103, 104
Genes
adipocyte, 109-19
fructose metabolism and, 44, 51, 54
glucokinase, 62
metal elements and, 449-65
oxidative phosphorylation diseases and, 537-42
peroxisomal thiolase, 348
transcription of
PUFA regulation of, 83-94
transthyretin, 499-502
Germany
transthyretin and, 502
Germ-free rats
artifical rearing techniques and, 23-24, 26-27
GH_3 cells
insulin secretion and, 69
Ghosts
peroxisomal, 363
Ginger ale
choline and, 284
Glibenclamide
insulin secretion and, 71
Glucagon
essential fructosuria and, 52
PUFAs and, 89
transthyretin and, 506, 510-11
Glucagon-like peptide (GLP)
insulin secretion and, 62-64, 76
α-Glucans
resistant starch and, 299-300, 303-7
Glucocorticoids
adipocyte development and, 101, 103-4, 106-7, 114
PUFAs and, 89-91
transthyretin and, 505, 511, 517-18
Glucokinase
fructose metabolism and, 43, 45-46
insulin secretion and, 60, 61, 62, 76
Glucose
AR rat pups and, 27-28, 33, 37
β-cells and, 60-62
choline and, 287
fructose metabolism and, 43, 45-46, 48, 50, 52-55
horse nutrition and, 246-47, 253
insulin secretion and, 60-62, 67, 69-72, 75-76
osteopenia of prematurity and, 171, 175
resistant starch and, 298-99, 304, 306, 308
solvent drag and, 424
transthyretin and, 507-8
Glucose-oral rehydration solution (G-ORS)
dehydration and, 322-25
Glucose 6-phosphate dehydrogenase
AR rat pups and, 33-34, 37
PUFAs and, 85
vitamin C and, 383
GLUT2 glucose transporter
insulin secretion and, 60-61
GLUT4 protein
adipocyte development and, 103
Glutamate
choline metabolism and, 272
nitric oxide synthases and, 133
Glutamine
horse nutrition and, 255
intravenous, 428, 432-34
oral rehydration solutions and, 327, 334, 336
Glutamine synthetase
adipocyte development and, 103
Glutathione peroxidase
horse nutrition and, 261
Glycemic index
resistant starch and, 309-10
Glyceraldehyde (GAH)
adipocyte development and, 103
fructose metabolism and, 43, 48
Glycerol
fructose metabolism and, 43, 53-54
Glycerol 3-phosphate dehydrogenase (G3PDH)
adipocyte development and, 103, 108
Glycerophosphate dehydrogenase
FAD-linked
insulin secretion and, 62
Glycerophosphocholine
choline metabolism and, 270-71
Glycine
childhood malnutrition and, 8
human requirements for, 222-23
oral rehydration solutions and, 327, 331
Glycine-*N*-methyltransferase
choline and, 273
Glycogen
fructose metabolism and, 43, 45, 54
horse nutrition and, 253
Glycolytic-gluconeogenic pathway
fructose metabolism and, 42-43, 52
Glycosaminoglycans
vitamin C and, 373
Glycyl glycine
oral rehydration solutions and, 327
G proteins
adipocyte development and, 103
choline and, 275, 278
insulin secretion and, 62-64, 73, 76
Grains
horse nutrition and, 247, 250, 252, 255-56
resistant starch and, 304-5

Grape juice
choline and, 284
Grasses
horse nutrition and, 247-48
Greece
breast cancer and, 407
transthyretin and, 502
Green gram
oral rehydration solutions and, 327
Growth factors
milk and, 147-61
Growth hormone (GH)
adipocyte development and, 104-5
AR rat pups and, 30-31
stunting and, 12
Guanosine diphosphate (GDP)
insulin secretion and, 63
Guanosine triphosphate (GTP)
fructose metabolism and, 42, 47-48, 52
insulin secretion and, 63
Guanylate cyclase
nitric oxide synthases and, 132-33
Guanylyl cyclase
nitric oxide synthases and, 134-35
Gulf of Mexico
migratory birds and, 191
Guyana
childhood malnutrition and, 3

H

H^+
amino acid transport and, 422
Haemophilus influenzae
iron-binding proteins and, 485
Hand feeding
AR rat pups and, 23-24
Haploid cells
childhood malnutrition and, 6
Haptoglobin
infection and, 476, 486-87
Hay
horse nutrition and, 248, 252, 255
Heart
peroxisome proliferation and, 359
Height
breast cancer and, 394-96
Helicobacter spp.
iron-binding proteins and, 477, 485-86
Heme
infection and, 476, 486-87
nitric oxide synthases and, 137-41
Hemicellulose
horse nutrition and, 247
Hemin
infection and, 487
Hemoglobin
essential fructosuria and, 49
infection and, 476, 486-87
Hemopexin
infection and, 476, 486-87
Hepatomegaly
childhood malnutrition and, 3
essential fructosuria and, 49, 52
Herbicides
peroxisome proliferation and, 356
Herbivory
migratory birds and, 196
Hexokinase
fructose metabolism and, 43, 45
Hexose biphosphatase
fructose metabolism and, 44
High-carbohydrate diet
AR rat pups and, 22-23, 28-29, 33-37
High-energy diet
horse nutrition and, 245
High-fat diet
AR rat pups and, 22, 29, 35, 37
breast cancer and, 394
horse nutrition and, 250, 253
Hirundo rustica
energy storage and, 188
Histidine
horse nutrition and, 255
human requirements for, 218, 220-23, 226-27, 236
HIT T15 cells
insulin secretion and, 63-66, 71
HL60 cells
insulin secretion and, 64
HNF3/*forkhead* transcription factor
adipocyte development and, 116, 118
HNF-4 factor
PUFAs and, 92
Holland
breast cancer and, 399, 407
transthyretin and, 502
Homocysteine
choline and, 273
Hormones
adipocyte development and, 103
AR rat pups and, 29
insulin secretion and, 62
milk and, 148
Hormone-sensitive lipase
adipocyte development and, 103
Horse
nutrition of
body size and, 249
digestive tract and, 244-48
energy and, 248-55
environmental temperature and, 254-55
function of animal and, 250-54
introduction to, 243-44
minerals and, 257-59
protein and, 255-57
vitamins and, 259-61
Humoral factor
insulin and, 155
Hungary
transthyretin and, 502
Hydrogen
breath
resistant starch and, 311
Hydrolase
tissues and, 421
Hydroxamates
infection and, 478, 485
1α-Hydroxylase
osteopenia of prematurity and, 175
3-Hydroxy-3-methyl-glutaryl-CoA reductase
AR rat pups and, 35
3-Hydroxy-3-methyl-glutaryl-CoA synthase
AR rat pups and, 35
Hyperaldosteronism
secondary
oral rehydration solutions and, 333, 335
Hyperkalemic periodic paralysis
horse nutrition and, 258-59
Hyperpipecolic acidemia
peroxisomal lipid metabolism and, 362
Hypoglycemia
fructose metabolism and, 49, 52-55
Hypokalemia
oral rehydration solutions and, 328-29
Hypolipidemic drugs
peroxisome proliferation and, 356
Hypomethylation
adipocyte development and, 101
Hypomineralization
osteopenia of prematurity and, 169, 171-73, 179
Hypophysectomy
AR rat pups and, 30-31
Hypothalamo-pituitary-adrenal (HPA) axis
migratory birds and, 204

I

IBMX
insulin secretion and, 65

Idebenone
oxidative phosphorylation diseases and, 557
Idiopathic thrombocytopenic purpura
vitamin C and, 383
IEC-6 epithelial cells
TGF-β1 and, 160
IgA
TGF-β and, 160
IGF-binding proteins
adipocyte development and, 103
milk and, 153-54, 157-59
Ileum
amino acids and, 226-27
hydrolase and, 421
resistant starch and, 307-8, 310
Imidazole
nitric oxide synthases and, 141
Immune response
vitamin C and, 382-83
India
childhood malnutrition and, 2-4, 12, 14
Indomethacin
adipocyte development and, 104
Infants
choline and, 285
epidermal growth factor and, 149-50
essential fructosuria and, 49-50, 52
fractures and, 170-73, 179, 181-82
osteopenia and, 169-83
rickets and, 170, 173, 178-79, 181-82
transthyretin and, 504-5, 508
Infection
childhood malnutrition and, 7-8, 10, 15-17
fructose 1,6-biphosphatase deficiency and, 53, 55
growth failure and, 15-16
iron proteins and, 471-88
Inflammation
transthyretin and, 518-20
Inosine monophosphate (IMP)
fructose metabolism and, 48
Inositol triphosphate (IP_3)
insulin secretion and, 66-67, 73-75
Insects
migratory birds and, 192-95, 197
Insulin
adipocyte development and, 103-5
AR rat pups and, 33-34, 36-37
childhood malnutrition and, 7-8
milk and, 148, 151, 153-56, 161
nonglucose secretagogues
adenylyl cyclase and, 62-64
arachidonic acid and, 68-69
Ca^{2+} and, 69-75
cAMP and, 64-66
diacylglycerol and, 67-68
glucose as primary β cell stimulus, 60-62
G proteins and, 62-64
inositol 1,4,5-triphosphate and, 66-67
introduction to, 59
K^+ and, 70-71
membrane potential and, 69-72
phosphatidic acid and, 69
phospholipids and, 66-69
second messengers and, 64-66
peptide diets and, 427
PUFAs and, 89-91, 94
transthyretin and, 510
Insulin-like growth factor I (IGF-I)
adipocyte development and, 102-3, 105-7
milk and, 148, 151, 153-54, 157-59, 161
stunting and, 13
Insulin-like growth factor II (IGF-II)
milk and, 151, 153-54, 157-59, 161
stunting and, 13
Interferon γ (IFN-γ)
nitric oxide synthases and, 134, 140
Interleukins
adipocyte development and, 105
transthyretin and, 511-12, 519
Intestines
AR rat pups and, 23, 27-31, 38
growth factors and, 152-53, 161
peptides and, 421-25
Intragastric tube feeding
AR rat pups and, 24-26
Invert sugar
fructose metabolism and, 48, 53
Iodine
childhood malnutrition and, 4
Ion channels
insulin secretion and, 60
Ireland
transthyretin and, 502
Iron
childhood malnutrition and, 4
gene regulation and, 450, 452, 455-56, 463
vitamin C and, 380
Iron-binding proteins
pathogenic bacteria and
classes of, 473-77
heme and, 486
heme/protein complexes, 476
infectious disease and, 471-73
iron-storage proteins, 475-76
iron-sulfur proteins, 476-77
iron-transport proteins, 474-75
nonheme, nonsulfur iron proteins, 477
siderophilin and, 481-86
siderophores and, 478-81
Isoflavanoids
breast cancer and, 412
Isoleucine
horse nutrition and, 255
human requirements for, 218, 220, 226, 233
Isotopes
amino acids and, 227-30
Israel
breast cancer and, 398
Italy
breast cancer and, 398, 407, 409
transthyretin and, 502

J

Jamaica
breast cancer and, 395, 400
childhood malnutrition and, 3-5, 8, 13
Japan
resistant starch and, 315
transthyretin and, 501-2
Jejunum
AR rat pups and, 31
epidermal growth factor and, 152
fructose metabolism and, 51, 54
hydrolase and, 421
Jewish heritage
transthyretin and, 502
Junco hyemalis
energy storage and, 188

K

K^+
insulin secretion and, 65, 70-71
oral rehydration solutions and, 329, 333
Kearns-Sayre syndrome
oxidative phosphorylation and, 536, 543-44
Kenya
stunting and, 12
Ketohexokinase
fructose metabolism and, 42

α-Ketoisocaproate (KIC)
amino acids and, 228, 237
Ketones
AR rat pups and, 28
fructose 1,6-biphosphatase deficiency and, 53
Ketose
fructose 1,6-biphosphatase deficiency and, 55
Kidney 293 cells
nitric oxide synthases and, 135, 140
Kidneys
AR rat pups and, 22, 28
childhood malnutrition and, 6
choline and, 271, 285
epidermal growth factor and, 152
fructose metabolism and, 42, 44-45, 49-50, 54
hydrolase and, 421
osteopenia of prematurity and, 179
peroxisome proliferation and, 359
Kwashiorkor
childhood malnutrition and, 1-10, 14-16
oral rehydration solutions and, 334

L

Laboratory chow
AR rat pups and, 29, 33, 36
Lactase
AR rat pups and, 29-31
epidermal growth factor and, 152
Lactate
fructose metabolism and, 46-48, 54
Lactate dehydrogenase
adipocyte development and, 103
PUFAs and, 89
Lactation
choline and, 288
epidermal growth factor and, 149-50
fetal alcohol syndrome and, 31
horse nutrition and, 249, 251, 257-58
relaxin and, 156
Lactic acid
fructose metabolism and, 46, 53
Lactoferrin
infection and, 474-75, 484-87
Lactose
AR rat pups and, 29
horse nutrition and, 251
intolerance
resistant starch and, 308
Laminin
adipocyte development and, 103
Lanius collurio
energy storage and, 203
LAP protein
adipocyte development and, 113-14, 117
Large intestine
horse nutrition and, 248
resistant starch and, 310-15
Lean body mass (LBM)
childhood malnutrition and, 5
migratory birds and, 189, 191
Lebanon
childhood malnutrition and, 3
Leber's hereditary optic neuropathy (LHON)
oxidative phosphorylation and, 536, 546-48
Legionella pneumophila
iron-binding proteins and, 475, 478
Legumes
oral rehydration solutions and, 331, 335
resistant starch and, 307, 309
Leigh's disease
oxidative phosphorylation and, 548-49
Lentils
resistant starch and, 307
Lettuce
iceberg
choline and, 284
Leucine
horse nutrition and, 255
human requirements for, 218, 220, 225-28, 230-35, 237
peroxisomal lipid metabolism and, 362
Leucine aminopeptidase
epidermal growth factor and, 152
Leucine zipper domains
adipocyte development and, 110, 113, 117
Leukocytes
fructose 1,6-biphosphatase deficiency and, 54
Leukotriene D_4 antagonists
peroxisome proliferation and, 356
Limosa lappponica
energy storage and, 191
Linoleic acid
migratory birds and, 191
α-Linolenic acid
gene transcription and, 87
Lipid peroxides
choline and, 281
Lipids
adipocyte development and, 103
AR rat pups and, 22, 27, 29, 32-37
migratory birds and, 190-91, 196-98
peroxisomes and, 343-64
PUFAs and, 85
Lipopolysaccharide (LPS)
horse nutrition and, 247
lactoferrin and, 475
nitric oxide synthases and, 132, 140
Lipoprotein lipase
adipocyte development and, 103-4
Lipoproteins
vitamin C and, 377-79
LIP protein
adipocyte development and, 113-14, 117
Lithuania
transthyretin and, 502
Liver
AR rat pups and, 22, 28, 32-36
childhood malnutrition and, 3-4, 6-7, 9-10
choline and, 271-73, 281-82, 285, 287-88
fructose metabolism and, 42-47, 49-52, 54
hydrolase and, 421
insulin secretion and, 61-62
peroxisome proliferation and, 355-59
PUFAs and, 84-85, 87, 89-90, 94
VLDL and, 277
Liver aldolase
fructose metabolism and, 42
Lonchura punctulata
energy storage and, 192
Low birth weight (LBW)
osteopenia of prematurity and, 169-70, 173-77, 180-82
Low-fat diet
breast cancer and, 394
Low T3 syndrome
transthyretin and, 513
Loxia sp.
energy storage and, 188
LPL protein
adipocyte development and, 107, 112, 116
Luft's disease
oxidative phosphorylation and, 535
Lymphokines
nitric oxide synthases and, 134
Lysine
childhood malnutrition and, 9
horse nutrition and, 255-56

human requirements for, 218, 220, 222-26, 228-29, 232-36
peroxisomal lipid metabolism and, 362
Lysophosphatidic acid acyltransferase
adipocyte development and, 103
Lysophosphatidylcholine
choline metabolism and, 270-71, 280
Lysosphingomyelin
choline metabolism and, 270, 281

M

Macrophages
nitric oxide synthases and, 135-38, 140
Magnesium
fructose metabolism and, 50, 54
horse nutrition and, 251
Maize
childhood malnutrition and, 14
oral rehydration solutions and, 327-28, 335
resistant starch and, 305-7
Maize oil
AR rat pups and, 27-28
Malabsorption
peptide diets and, 425
resistant starch and, 308-9
Malic enzyme
adipocyte development and, 103
AR rat pups and, 34
PUFAs and, 85
Malnutrition
childhood
body composition and, 5-7
edema and, 7-8
energy requirements and, 13-15
growth failure and, 15-16
infection and, 15-16
kwashiorkor and, 1-2
names and causes, 4-5
protein requirements and, 13-15
protein turnover and, 8-10
public health problems and, 11-16
stunting and, 11-13
treatment problems and, 10-11
worldwide research and, 3-4
Maltase
AR rat pups and, 29-31
tissues and, 421
Maltodextrins
oral rehydration solutions and, 326-28, 330
Maltose
resistant starch and, 304
Manganese
gene regulation and, 450, 456, 463
Marasmus
childhood malnutrition and, 4, 7-8, 15-16
oral rehydration solutions and, 334
MARCKS protein
insulin secretion and, 67-68
Margarine
choline and, 284
MCT oil
AR rat pups and, 27
Mediterranean
migratory birds and, 188, 198, 202
transthyretin and, 501-2
Medium-chain triglyceride oil
osteopenia of prematurity and, 171
Melituria
essential fructosuria and, 50
Membrane potential
insulin secretion and, 69-72
Menadione
oxidative phosphorylation diseases and, 556
Menhaden oil
PUFAs and, 88
Mental development
stunting and, 13
Mercury
gene regulation and, 450, 452, 455
Messenger RNA (mRNA)
442/aP2, 112
acute-phase protein, 512
ADD1, 115
AGP, 514, 517
albumin, 460
C/EBPα, 112
CHOp-10, 118
epidermal growth factor, 148-49
FAS, 86-88
glucokinase, 61
GLUT2, 60
IGF-I, 157
lactase, 156
metallothionein, 458-59
β-oxidation enzyme, 357
PPAR, 360
proinsulin, 65
relaxin, 156
S14, 86-88
soluble epoxide hydrolase, 358
superoxide dismutase, 463
TBG, 514
TGF-α, 160
TGF-β, 160
transthyretin, 500, 504-5, 508, 512
Messer's formula
AR rat pups and, 30
Metabolism
amino acids and, 232, 234-35
AR rat pups and, 21-23, 28-36
childhood malnutrition and, 6
choline, 271-77
fructose, 41-55
horse nutrition and, 249, 253-56
iron, 380
migratory birds and, 196
oral rehydration solutions and, 334
peptide, 421-25, 438
peroxisomal lipid, 343-64
transthyretin, 503-6
Metal elements
gene expression and
acute phase proteins, 460-61
applications, 463-65
gene regulation, 450-52
introduction, 449-50
mammalian genes, 456, 461-63
metal regulation, 452-56, 461-63
metallothionein, 457-60
microbial model systems and, 455-56
Metallothionin
gene expression and, 457-60
Methane
horse and, 246
Methionine
choline metabolism and, 271-73, 286, 288
deficiency of, 3
human requirements for, 218, 220, 225-26, 233-34, 236
Methotrexate
choline and, 273
nitric oxide synthases and, 136
3-Methyl-branched fatty acids
degradation of, 352-53
Methyl clofenapate
peroxisome proliferation and, 356
Methyl-folate
choline metabolism and, 271-73
Methylisobutylxanthine (MIX)
adipocyte development and, 102, 104-5
Mexico
childhood malnutrition and, 3, 12, 14
stunting and, 12

Mg^{2+}
fructose metabolism and, 47
MICP protein
infection and, 478
Microbes
amino acids and, 236
equine hindgut and, 246-47
metal elements in gene expression and, 455-56
Micronutrients
breast cancer and, 406-11
Middle East
childhood malnutrition and, 14
Milk
childhood malnutrition and, 10, 14-15
choline and, 283-85
essential fructosuria and, 49
growth factors and, 147-61
horse nutrition and, 251-52, 258
osteopenia of prematurity and, 170-72, 174, 179, 181
Milk-substitute formulas
AR rat pups and, 22, 26-29
Millet
childhood malnutrition and, 14
oral rehydration solutions and, 327-28, 335
Mimus polyglottus
energy storage and, 198
Minerals
AR rat pups and, 28
horse nutrition and, 257-59
Mitochondria
fatty acid oxidation and, 349-52
fructose metabolism and, 46-47
PUFAs and, 85
Mitochondrial DNA (mtDNA) mutations
oxidative phosphorylation diseases and, 535-57
Modular feeding formula
AR rat pups and, 27
Molasses
horse nutrition and, 259
Monooxygenases
infection and, 477
vitamin C and, 373
Moscow
breast cancer and, 408
Motacilla flava
energy storage and, 192
Multipotent stem cells
adipocyte development and, 101-2
Multivitamins
osteopenia of prematurity and, 171
Muscicapa striata
energy storage and, 205
Muscle
childhood malnutrition and, 6-8
hydrolase and, 421
Mycoplasma pneumoniae
iron-binding proteins and, 485
Myoglobin
infection and, 476, 487
Myristoylation
nitric oxide synthases and, 136-37

N

Na^+
amino acid transport and, 422
insulin secretion and, 66
oral rehydration solutions and, 325-26, 328-29, 332-36
NADH
peroxisomal lipid metabolism and, 349
NADPH
nitric oxide synthases and, 131, 133, 135-37, 139, 141-42
peroxisomal lipid metabolism and, 354
Nafenopin
peroxisome proliferation and, 356
PUFAs and, 93
Na/K ATPase α2 subunits
adipocyte development and, 103, 104
Nearctic
migratory birds and, 188
Necrotizing enterocolitis
growth factors and, 161
osteopenia of prematurity and, 172
Necturus maculosus
amino acid transport and, 422
Neisseria spp.
iron-binding proteins and, 479, 481-85, 486, 488
Neonates
fructose 1,6-biphosphatase deficiency and, 54
growth factors in milk and, 148, 151-53, 155-59
transthyretin and, 504, 506
Nepal
stunting and, 11
Nerve growth factor (NGF)
milk and, 151, 159, 161
Neurodegeneration
oxidative phosphorylation and, 548-49
Neuroendocrine peptides
vitamin C and, 373
Neurotransmitters
insulin secretion and, 62
nitric oxide synthases and, 132, 141
New Guinea
stunting and, 12
New Zealand
migratory birds and, 188
L-NHA
nitric oxide synthases and, 137-39
Niacin
nitric oxide synthases and, 142
Nitric oxide synthases
biochemistry of, 134-37
biology of, 132-34
introduction to, 131-32
mechanism of, 137-41
nitric oxide and, 132-34
transthyretin and, 518
Nitrogen
assimilation
dual modes of, 422
balance
amino acids and, 219-23, 232-34
transthyretin and, 508-9, 511-12, 519
horse nutrition and, 247-48, 256
turnover
childhood malnutrition and, 9
NMDA
nitric oxide synthases and, 132-33
Nonfat dry milk
AR rat pups and, 27
Norepinephrine
vitamin C and, 373
North America
migratory birds and, 188
Norway
breast cancer and, 399
Nuclear magnetic resonance (NMR)
essential fructosuria and, 51
Nucleus
cellular
PUFAs and, 85
Numenius tahitiensis
energy storage and, 188

O

Oats
horse nutrition and, 249, 255
resistant starch and, 305
Ob17 cells
adipocyte development and, 104
ob/ob mice
insulin secretion and, 62
Obesity
AR rat pups and, 35-37

breast cancer and, 397
migratory birds and, 205
transthyretin and, 508
Oils
horse nutrition and, 249, 253
Okadaic acid
choline and, 282
Oleic acid
horse nutrition and, 253
migratory birds and, 191
Oncogenes
choline and, 282
1246 cells
adipocyte development and, 101
Oral rehydration
in diarrhea
alternative organic substrates and, 323-32
glucose-oral rehydration solutions and, 322-25
improving solutions, 333-36
physiological considerations and, 325-27
Oranges
choline and, 284
Organic substrate-electrolyte solutions
oral rehydration and, 322-36
Orosomucoid
transthyretin and, 511, 520
Osteocalcin
osteopenia of prematurity and, 178-80
stunting and, 13
Osteomalacia
osteopenia of prematurity and, 170
Osteopenia
of prematurity
clinical cases of, 170-72
diagnosis of, 176-80
incidence of, 173
introduction to, 169-70
outcome of, 180-83
pathophysiology of, 173-76
treatment of, 180-83
Osteoporosis
osteopenia of prematurity and, 183
OTCA
cysteine peptide prodrugs and, 430-32
Overfeeding
AR rat pups and, 35
Oxidation
amino acid, 223-32
α-Oxidation
peroxisomes and, 352-53
β-Oxidation
peroxisomes and, 345-52, 359-62
Oxidative phosphorylation (OXPHOS)
diseases
coenzymes and, 554-56
diagnostic overview of, 542-43
introduction to, 535-36
maternal inheritance and, 545-46
metabolic intermediates and, 557
mtDNA genetics and, 537-42
mtDNA mutations and, 543-53
pharmaceuticals and, 557-58
therapy for, 552-58
vitamins and, 556-57
Oxygen
childhood malnutrition and, 9
horse nutrition and, 249
nitric oxide synthases and, 137

P

442/aP2 protein
adipocyte development and, 103-4, 112, 115, 117
Pacific Ocean
migratory birds and, 188
Pakistan
stunting and, 12
Palate cannula
AR rat pups and, 24-25
Palmitic acid
migratory birds and, 197
Palmitoyl-CoA oxidase deficiency
peroxisomal lipid metabolism and, 364
Panama
childhood malnutrition and, 3
Pancreas
β-cells
AR rat pups and, 37
insulin secretion and, 60-62, 65-67, 69-75
Parathyroid hormone (PTH)
osteopenia of prematurity and, 178-79, 182
Parenteral nutrition
choline and, 288
osteopenia of prematurity and, 171-72
Parkinson's disease
oxidative phosphorylation and, 536
vitamin C and, 381
Patagonia
migratory birds and, 188
Peanut butter
choline and, 284
Peanuts
choline and, 284
Pearson's syndrome
oxidative phosphorylation and, 544-45
Peas
resistant starch and, 306-7
Pelde sp.
resistant starch and, 309
PEP-carboxykinase (PEPCK)
adipocyte development and, 103
PUFAs and, 88-89
Pepti 2000
peptide diets and, 426
Peptides
absorptive capacity and, 425-27
animal studies and, 426-27
blood and, 420-21
clinical applications and, 425-27
critically ill patients and, 427
cysteine peptide prodrugs, 430-31
di- and tripeptide mixtures, 434-37
dietary protein and, 420-21
digestive capacity and, 425
enzymes and, 422
feeding schedules and, 427
glutamine peptide prodrugs, 432-34
healthy volunteers and, 425-26
intracellular protein degradation and, 421
intravenous, 428-34, 438
introduction to, 420
kinetics and, 421-22
large-scale production of, 434-36
nitrogen assimilation and, 422
parenteral, 429
protein hydrolysates and, 436-37
solvent drag and, 424-25
surgical patients and, 427
synthetic peptides as prodrugs, 429
tissues and, 420-21
transport of, 422-27
tyrosine peptide prodrugs, 431
uptake of, 422, 424
Peptisorb
peptide diets and, 426
Perilipin
adipocyte development and, 103
Peripheral nervous system (PNS)
nerve growth factor and, 159
Peroxidase
infection and, 476
Peroxisomes
lipid metabolism in
cholesterol and, 355
δ4 desaturation and, 353

disorders of, 362-64
dolichols and, 355
enzymes and, 346-49, 359-62
ether glycerolipids and, 353-55
fatty acids and, 345-46, 352-53
introduction to, 343-45
mitochondrial fatty acid oxidation and, 349-52
α-oxidation and, 352-53
β-oxidation and, 345-52, 359-62
peroxisome proliferators and, 355-62
PUFAs and, 85, 92-93
Pertussis toxin
insulin secretion and, 63-64
pH
fructose 1,6-biphosphatase deficiency and, 53
horse nutrition and, 245, 247
osteopenia of prematurity and, 175
Phaseolus vulgaris
resistant starch and, 305
Phenolates
infection and, 478
Phenylalanine
human requirements for, 218, 220, 222-24, 225, 233
Phenylalanine hydroxylase
infection and, 477
Phenylketonuria (PKU)
transthyretin and, 509
Phthalate ester plasticizers
peroxisome proliferation and, 356
Phylloquinone
oxidative phosphorylation diseases and, 556
Physical performance
vitamin C and, 380-81
Phytanic acid
peroxisomal lipid metabolism and, 352-53
Phytochemicals
anticarcinogenic
breast cancer and, 412
Pisum sativum
resistant starch and, 299, 306
Phorbol esters
adipocyte development and, 106
choline and, 282
Phorbol-12-myristate, 13-acetate
insulin secretion and, 68
Phosphate
fructose metabolism and, 43, 47-48, 50, 52, 54-55
osteopenia of prematurity and, 171-72, 174-75, 179-80, 182
Phosphatidic acid
choline and, 280
insulin secretion and, 69
Phosphatidylcholine
choline metabolism and, 273-75
Phosphatidylethanolamine *N*-methyltransferase
choline and, 273-75, 283
Phosphoenolpyruvate carboxykinase
AR rat pups and, 33
Phosphofructokinase
fructose metabolism and, 43
Phosphoglucose isomerase
fructose metabolism and, 43
Phospholipases
adipocyte development and, 103
choline and, 278, 282
insulin secretion and, 63-64, 66, 68-69, 74, 76
Phospholipids
choline metabolism and, 275, 277-84
insulin secretion and, 66-69
Phosphopeptides
insulin secretion and, 66
Phosphorus
horse nutrition and, 246-47, 254, 258
osteopenia of prematurity and, 170-76, 178-79, 181-82
stunting and, 12
Phosphorylase A
essential fructosuria and, 52
Phosphorylation
choline and, 280-81
insulin secretion and, 61-62, 65-68, 73
PUFAs and, 93
nitric oxide synthases and, 137
Photoperiodicity
migratory birds and, 199-201, 203-6
Phylloscopus spp.
energy storage and, 188, 199-201, 203
Pioglitazone
adipocyte development and, 106
Pituitary gland
AR rat pups and, 29
Plantains
childhood malnutrition and, 14
oral rehydration solutions and, 327
Plants
migratory birds and, 192, 196
Plasmalogens
choline and, 271
peroxisomal lipid metabolism and, 354-55
Platelet-activating factor (PAF)
choline and, 270-71, 275
peroxisomal lipid metabolism and, 354
Platelet-derived growth factor (PDGF)
adipocyte development and, 107
choline and, 280
Pleiotropic responses
peroxisomal lipid metabolism and, 356-59
Poland
breast cancer and, 398
transthyretin and, 502
Polyunsaturated fatty acids (PUFAs)
in regulation of gene transcription
enzyme synthesis inhibition and, 85-86
fatty acid inhibitors and, 86-87
hepatic lipogenesis and, 85
introduction to, 83-85
(*n*-3) polyenoic fatty acids and, 85-93
(*n*-6) polyenoic fatty acids and, 85-93
pretranscriptional control and, 89-91
prospective mechanisms and, 91-93
Porphyrins
infection and, 476
Porphyromonas gingivalis
iron-binding proteins and, 485, 487
Portugal
transthyretin and, 501-2
Potassium
childhood malnutrition and, 5, 8
horse nutrition and, 258-59
oral rehydration solutions and, 322
Potatoes
choline and, 284
oral rehydration solutions and, 327
resistant starch and, 300-1, 304, 306-7, 309-10
PPAR protein
peroxisomal proliferation and, 360-62, 364
PUFAs and, 92-93
PPREs
peroxisomal proliferation and, 360-62, 364

Preadipocytes
adipocyte development and, 102-6
PRE-binding protein
adipocyte development and, 109
pref-1 protein
adipocyte development and, 103
Pregnancy
choline and, 271, 283-84, 288
fetal alcohol syndrome and, 31
folate and, 271
horse nutrition and, 250-51
osteopenia of prematurity and, 169
transthyretin and, 504
Prematurity
osteopenia and, 169-83
Pretranscriptional control
PUFAs and, 89-91
Prevotella melaningencia
iron-binding proteins and, 485
Primary preadipose cells
adipocyte development and, 104-5
Prodrugs
cysteine peptide, 430-31
glutamine peptide, 432-34
intravenous peptides and, 430-32
synthetic peptides and, 429
tyrosine peptide, 431
Progesterone
adipocyte development and, 106
Progestogens
transthyretin and, 505
Proline
essential fructosuria and, 51
Proline hydroxylase
infection and, 477
Propionate
horse nutrition and, 246-47
resistant starch and, 311-13, 315
Prostacyclin
adipocyte development and, 106
Prostaglandins
adipocyte development and, 105-6
α1-Protease inhibitor
transthyretin and, 517-18
Protein
adipocyte development and, 103, 108
AR rat pups and, 26-28
childhood malnutrition and, 2, 4-10, 13-15, 17
horse nutrition and, 248, 250, 253, 255-57, 261
hydrolysates and, 436-37
migratory birds and, 190, 198
Protein-energy malnutrition (PEM)
childhood malnutrition and, 4-6, 10-11, 13-14, 16-17
transthyretin and, 506-7, 510, 516, 518
Protein-free diet
amino acid loss and, 227, 232-34
Protein kinase C
choline and, 274, 276, 278-82
Protein kinases
choline and, 274, 276
insulin secretion and, 64-68, 73, 76
nitric oxide synthases and, 135
PUFAs and, 88, 93
Proteinuria
essential fructosuria and, 50
Proteoglycan
adipocyte development and, 103
Protoporphyrin
infection and, 486
Provitamin A
breast cancer and, 412
Public health
childhood malnutrition and, 11-16
PUFA-BP protein
gene transcription and, 92
Pup in a cup technique
AR rat pups and, 24-25
Purines
catabolism of
fructose and, 47-48
Purkinje cells
AR rat pups and, 32-33
Pyroglutamic acid
cysteine peptide prodrugs and, 430-32
Pyruvate carboxylase
adipocyte development and, 103
Pyruvate dehydrogenase
PUFAs and, 86

Q

Quantitative computed tomography (QCT)
osteopenia of prematurity and, 177
Quin-2
insulin secretion and, 65, 72

R

*rab*3D protein
adipocyte development and, 103
RAW 264 cells
nitric oxide synthases and, 137, 140
RCJ 3.1 cells
adipocyte development and, 101
Reabilan
peptide diets and, 426
Refeeding
migratory birds and, 205
Refsum's disease
peroxisomal lipid metabolism and, 352, 362
Regulatory protein
insulin secretion and, 62
Relaxin
milk and, 151, 156-57
Respiratory symptoms
vitamin C and, 381-82
Retinitis pigmentosa
oxidative phosphorylation and, 548-49
Retinoic acid
adipocyte development and, 103, 106
peroxisome proliferation and, 356
PUFAs and, 91
Retinoid-binding proteins
adipocyte development and, 103
Retinol
breast cancer and, 406, 409
horse nutrition and, 259
Retinol-binding protein
transthyretin and, 496, 498-99, 503-7, 511-12, 514-16, 520
Retinyl acetate
breast cancer and, 406
Retrogradation
resistant starch and, 302-3
RFL-6 cells
nitric oxide synthases and, 136
Rhizomelic chondrodysplasia punctata
peroxisomal lipid metabolism and, 363
Rhodotorulic acid
infection and, 480
Riboflavin
nitric oxide synthases and, 142
oxidative phosphorylation diseases and, 556-57
Ribonucleotide reductase
infection and, 477
Ribosomes
fructose metabolism and, 47
insulin secretion and, 66
Rice
childhood malnutrition and, 14
hulls
horse nutrition and, 247

oral rehydration solutions and, 327-28, 331, 335-36
resistant starch and, 306, 308-9, 314-15
Rickets
osteopenia of prematurity and, 169-70, 173, 176, 178-79, 181-82
RINm5F cells
insulin secretion and, 65, 75
RIP-cHras transgenic mice
insulin secretion and, 61
RNA
fructose metabolism and, 47
RNA polymerases
metal elements in gene expression and, 451, 453, 455
Rotavirus
epidermal growth factor and, 152
Ryanodine
insulin secretion and, 73-75
Rye
resistant starch and, 305

S

S14 protein
adipocyte development and, 103
PUFAs and, 86-91
Saccharomyces cerevisiae
metal elements in gene expression and, 456
Safflower oil
PUFAs and, 86-87
Sahara Desert
migratory birds and, 188, 190, 198, 202
Sahel
childhood malnutrition and, 14
Salmonella typhimurium I
nitric oxide synthases and, 131
Sambucus spp.
migratory birds and, 196
Saxicola rubetra
energy storage and, 200
SCD2 gene
adipocyte development and, 116
Scotland
transthyretin and, 502
Secondary plant metabolites
migratory birds and, 196
Second messengers
choline and, 278, 280
epidermal growth factor and, 149
insulin secretion and, 60, 62, 64-66
Secretin
transthyretin and, 506
Seeds
migratory birds and, 192
resistant starch and, 304
Selenium
breast cancer and, 410-11
gene regulation and, 463
horse nutrition and, 257
Semiquinones
nitric oxide synthases and, 139
Senegal
stunting and, 13
Serine
insulin secretion and, 68
peroxisomal lipid metabolism and, 362
Seventh-Day Adventists
breast cancer and, 401, 412
Shigella spp.
iron-binding proteins and, 480, 485, 487
Sickle cell anemia
vitamin C and, 383
Siderophilins
infection and, 474, 481-88
Siderophores
infection and, 478-81, 487-88
Signal transduction
choline and, 271, 278-81
insulin secretion and, 68
Singapore
breast cancer and, 407
Single photon absorptiometry (SPA)
osteopenia of prematurity and, 177-79, 181-82
Siroheme
nitric oxide synthases and, 131
Skimmed milk
AR rat pups and, 27-28
childhood malnutrition and, 10
Skin
childhood malnutrition and, 6
nitrogen loss and, 220-21, 225-26
Small intestine
fructose metabolism and, 42, 45
horse nutrition and, 244-48
peroxisome proliferation and, 359
resistant starch and, 307
Smugglins
intravenous peptides and, 429
Sodium
oral rehydration solutions and, 322
Sodium butyrate
adipocyte development and, 106
Sodium nitroprusside
nitric oxide synthases and, 137
Soluble epoxide hydrolase
peroxisome proliferation and, 358
Solvent drag
peptides and, 424-25
Solvents
peroxisome proliferation and, 356
Somatostatin
insulin secretion and, 62
Sorbitol
fructose metabolism and, 42-43, 48, 50-54
Sorghum
oral rehydration solutions and, 327-28, 335
South Africa
childhood malnutrition and, 3, 8, 14
migratory birds and, 188
South America
migratory birds and, 188
SoxR protein
metal elements in gene expression and, 456
Soybean meal
horse nutrition and, 248, 253, 255-56
Soy formulas
choline and, 285
fractures and, 173
rickets and, 173
Soy oil
AR rat pups and, 27
Soy products
breast cancer and, 412
Sphingomyelin
choline and, 270-71, 276, 280, 284
Sphingosine
choline and, 280-81
Spiza americana
energy storage and, 192
Splanchnic bed
fructose metabolism and, 42
Starch
horse nutrition and, 247
resistant
breath hydrogen and, 311
carbohydrate gap and, 310
complex carbohydrates and, 311-15
determination of in vivo, 307
digestion of, 304-8
fermentation and, 311-15
food processing and, 300-3, 306
formation of, 302-3
future research on, 315-16
gelation and, 302-3
glycemic index and, 309-10
heat/moisture treatment and, 301-2

introduction to, 297-98
large bowel and, 310-15
malabsorbed carbohydrate and, 308-9
manipulating levels of, 307-8
physiological consequences of, 308-11
retrogradation and, 302-3
short-chain fatty acids and, 311-15
structure of, 298-300, 305-6
Starchy roots
childhood malnutrition and, 14
Starvation
migratory birds and, 205
Staurosporine
insulin secretion and, 67-68
Stearic acid
migratory birds and, 197
Stearoyl CoA desaturases
adipocyte development and, 103
PUFAs and, 86
Steraldiete
peptide diets and, 426
Sterna paradisaea
energy storage and, 188
Steroids
transthyretin and, 504, 517, 519
Stomach
AR rat pups and, 28
horse nutrition and, 244
Streptococcus mutans
lactoferrin and, 475
Stress
transthyretin and, 510-19
Stunting
childhood malnutrition and, 11-13
Succinate
oxidative phosphorylation diseases and, 557
Sucrase
AR rat pups and, 29-31
epidermal growth factor and, 152
resistant starch and, 304
Sucrose
AR rat pups and, 36
fructose metabolism and, 42, 49, 52, 55
oral rehydration solutions and, 327
resistant starch and, 306
Sulfite reductase
nitric oxide synthases and, 135
Sulphonylurea
insulin secretion and, 60, 71
Sulphur
amino acids
human requirements for, 233-34
stunting and, 12
infection and, 476-77
Superoxide dismutase
manganese and, 463
nitric oxide synthases and, 141
Survimed
peptide diets and, 426
Sweden
breast cancer and, 399
transthyretin and, 501-2
Sylvia spp.
energy storage and, 188, 192, 199-201, 203

T

3T3-F442A cells
adipocyte development and, 102, 104
3T3-L1 cells
adipocyte development and, 100-2, 107, 109-10, 112-13, 116-18
10T1/2 cells
adipocyte development and, 100-1, 106, 118
TA1 cells
adipocyte development and, 104
Tapioca
resistant starch and, 306
Tenebrio larvae
migratory birds and, 194
Terminal differentiation
adipocyte development and, 108-9
12-*O*-Tetradecanoylphorbol-3-acetate
insulin secretion and, 67
Tetrahydrobiopterin (BH_4)
nitric oxide synthases and, 132, 134-36, 140, 142
Tetrahydrofolate
choline and, 273
Thailand
childhood malnutrition and, 3
Thiamine
oxidative phosphorylation diseases and, 556-57
Threonine
horse nutrition and, 255-56
human requirements for, 218, 220, 225-29, 233-34, 236
insulin secretion and, 68
Thymidine kinase
PUFAs and, 91
Thymulin
transthyretin and, 506
Thyroid hormones
adipocyte development and, 106
AR rat pups and, 29-30
PUFAs and, 90-91
transthyretin and, 495-99, 503, 505-6, 513-15, 518-20
Thyroid-stimulating hormone (TSH)
transthyretin and, 513
Thyroxine (T_4)
transthyretin and, 496-98, 503, 506, 513–14
Thyroxine-binding globulin (TBG)
transthyretin and, 497, 500, 513, 517-18
Tipeptid
peptide diets and, 426
α-Tocopherol
horse nutrition and, 259-60
Tolbutamide
insulin secretion and, 71
Tolerex
peptide diets and, 426
Tomatoes
choline and, 284
Total energy intake
breast cancer and, 394-99
Total parenteral nutrition (TPN)
choline and, 288
osteopenia of prematurity and, 175-76, 182
peptides and, 428, 430-37
Tracer balance method
amino acids and, 224-32
trans-acting factors
adipocyte development and, 109-18
PUFAs and, 87, 91-94
Transaminases
amino acids and, 236
essential fructosuria and, 50
Transcortin
transthyretin and, 506
Transcriptional control
adipocyte genes and, 109-19
Transferrin
infection and, 474-75, 481-88
transthyretin and, 506
Transforming growth factor α (TGF-α)
milk and, 148, 151, 159-60
Transforming growth factor β (TGF-β)
adipocyte development and, 105-6
milk and, 151, 159-60
Transthyretin (prealbumin)
acute stressful conditions and, 510-16
analytical procedures and, 496-97
chronic stressful disorders and, 516-19
conformational studies and, 497-99
gene expression and, 499-502

introduction to, 495-96
metabolism and, 503-6
nutritional surveys and, 506-10
physiology and, 503-6
Travasorb
peptide diets and, 426
Treponema pallidum
iron-binding proteins and, 485
Triacylglycerol
adipocyte development and, 99, 102, 104, 112
choline and, 277
migratory birds and, 191
Trichloroethylene
peroxisome proliferation and, 356
Trichomonas vaginalis
iron-binding proteins and, 485
Triglycerides
AR rat pups and, 28, 34-35
choline and, 288
horse nutrition and, 253
migratory birds and, 191
osteopenia of prematurity and, 171
Triiodothyronine (T_3)
adipocyte development and, 104
PUFAs and, 89, 91
transthyretin and, 498, 503, 513-14
Trinidad
childhood malnutrition and, 3
Triokinase
fructose metabolism and, 42-44, 47-48
Triolein
PUFAs and, 86, 88
Tripeptides
amino acids and, 434-37
Trophic factors
AR rat pups and, 30
Trypsin
nitric oxide synthases and, 141
Tryptophan
human requirements for, 218, 220, 233
intravenous, 428
transthyretin and, 509
Tubers
oral rehydration solutions and, 327
Tubulin
adipocyte development and, 102-3, 108-9
Tumor necrosis factor α (TNF-α)
adipocyte development and, 106, 109
choline and, 276
transthyretin and, 511
Tyrosine
human requirements for, 218, 222-23, 226, 233
intravenous, 428, 431
Tyrosine aminotransferase
PUFAs and, 88
Tyrosine kinases
adipocyte development and, 106
choline and, 280
epidermal growth factor and, 149

U

Uganda
childhood malnutrition and, 3, 10, 14-15
Underfeeding
AR rat pups and, 35
United Kingdom
stunting and, 12
United States
breast cancer and, 398-401, 407-9
essential fructosuria and, 51
transthyretin and, 501-2
Unsaturated fatty acids
migratory birds and, 191, 196
Urate
fructose metabolism and, 54
Urea
amino acids and, 236
childhood malnutrition and, 9-10
horse nutrition and, 247-48
transthyretin and, 511
Uric acid
fructose metabolism and, 48, 53
Urogastrone
milk and, 148
Uteroferrin
infection and, 477

V

Valine
horse nutrition and, 255
human requirements for, 218, 220, 225-26, 228, 233
Vanadium
gene regulation and, 463
Vegetable oil
childhood malnutrition and, 10
horse nutrition and, 250
Vegetables
breast cancer and, 412
essential fructosuria and, 49
Vegetarians
breast cancer and, 401
Verapamil
insulin secretion and, 65
Very-low density (VLDL) lipoprotein
choline and, 277
PUFAs and, 85
Vibrio cholerae
lactoferrin and, 475
Vitamin A
breast cancer and, 406-9
childhood malnutrition and, 4
horse nutrition and, 259
transthyretin and, 495, 505, 507, 514-15
Vitamin C
antioxidant properties and, 372-73
bioavailability of, 374
biochemical functions of, 372-73
blood pressure and, 376-77
breast cancer and, 410
cancer and, 379-80
cataracts and, 374-75
coronary heart disease and, 377-79
deficiency of, 372
derivatives of, 374
diabetes mellitus and, 376
idiopathic thrombocytopenic purpura and, 383
immunity and, 382-83
introduction to, 371-72
iron metabolism and, 380
lipoproteins and, 377-79
Parkinson's disease and, 381
pharmacological uses of, 374-83
physical performance and, 380-81
preparations of, 373-74
respiratory symptoms and, 381-82
sickle cell anemia and, 383
supplementation of, 380-81
supplements of, 373-74
toxicity of, 383-84
Vitamin D
choline and, 276
horse nutrition and, 259
osteopenia of prematurity and, 170-76, 179-82
rickets and, 173
Vitamin E
breast cancer and, 409-10
horse nutrition and, 259-61
peroxisomal lipid metabolism and, 351
Vitamin K
osteopenia of prematurity and, 180
oxidative phosphorylation diseases and, 556
peroxisomal lipid metabolism and, 351

Vitamins
AR rat pups and, 28
horse nutrition and, 259-61
osteopenia of prematurity and, 171
oxidative phosphorylation diseases and, 556-57

W

Wadden Sea
migratory birds and, 191
Water cycle
enterosystemic, 325, 330
Weight
breast cancer and, 395, 397
gain
rehydration and, 330
loss
childhood malnutrition and, 4, 16
Western diets
amino acids and, 238
West Indies
childhood malnutrition and, 2-3
Wheat
childhood malnutrition and, 2, 14
choline and, 284
oral rehydration solutions and, 327-28
resistant starch and, 305-6
Wheat bran
resistant starch and, 310, 313
Whey protein
AR rat pups and, 27

X

Xanthine oxidase
infection and, 477

Y

Yeast
horse nutrition and, 247
metal elements in gene expression and, 456
Yersinia pestis
iron-binding proteins and, 487

Z

Zaire
childhood malnutrition and, 3, 8
Zellweger syndrome
peroxisomal lipid metabolism and, 345, 362-63
Zinc
gene regulation and, 450-52, 454, 456-61, 463-65
horse nutrition and, 257-58
stunting and, 12
transthyretin and, 505-6
Zonotrichia spp.
energy storage and, 192, 198